WHAT IS CLAIMED IS:

1: A magnetic detecting element comprising a multilayer laminate comprising:

a free magnetic layer including a first free magnetic layer, a second free magnetic layer, and a nonmagnetic interlayer between the first free magnetic layer and the second free magnetic layer;

a lower nonmagnetic material layer, a lower pinned magnetic layer, and a lower antiferromagnetic layer underlying the free magnetic layer; and

an upper nonmagnetic material layer, an upper pinned magnetic layer, and an upper antiferromagnetic layer overlying the free magnetic layer;

wherein current flows in a direction perpendicular to a surface of each layer of the multilayer laminate, and

wherein β of a material constituting one of the first free magnetic layer and the second free magnetic layer has the same sign as β of magnetic materials constituting the lower pinned magnetic layer and the upper pinned magnetic layer, and β of a magnetic material of the other free magnetic layer has a different sigh from β of the magnetic materials constituting the lower pinned magnetic layer and the upper pinned magnetic layer, β being a characteristic value of a magnetic material satisfying the expression: $\rho\downarrow/\rho\uparrow = (1+\beta)/(1-\beta)$ $(-1 \leq \beta \leq 1)$, where $\rho\downarrow$ is specific resistance for minority conduction electrons, and $\rho\uparrow$ is specific resistance for majority conduction electrons.

2. A magnetic detecting element comprising a multilayer laminate comprising:

a free magnetic layer including a first free magnetic layer, a second free magnetic layer, and a nonmagnetic interlayer between the first free magnetic layer and the second free magnetic layer;

a lower nonmagnetic material layer, a lower pinned magnetic layer, and a lower antiferromagnetic underlying the free magnetic layer; and

an upper nonmagnetic material layer, an upper pinned magnetic layer, and an upper antiferromagnetic layer overlying the free magnetic layer;

wherein current flows in a direction perpendicular to a surface of each layer of the multilayer laminate, and

wherein β of a material constituting the first free magnetic layer has a sign same as β of a material constituting one of the lower pinned magnetic layer and the upper pinned magnetic layer, and different from β of magnetic materials constituting the second free magnetic layer and the other pinned magnetic layer, β being a characteristic value of a magnetic material satisfying the expression: $\rho\downarrow/\rho\uparrow = (1+\beta)/(1-\beta)$ $(-1 \leq \beta \leq 1)$, where $\rho\downarrow$ is specific resistance for minority conduction electrons, and $\rho\uparrow$ is specific resistance for majority conduction electrons.

3. A magnetic detecting element according to Claim 1 or 2, wherein the first free magnetic layer, the nonmagnetic

interlayer, the second free magnetic layer, the lower nonmagnetic material layer, and the upper nonmagnetic material layer each have a thickness smaller than the specific spin diffusion length of the respective materials thereof.

4. A magnetic detecting element comprising a multilayer laminate comprising:

a free magnetic layer including a first free magnetic layer, a nonmagnetic interlayer, a second free magnetic layer, a nonmagnetic interlayer, and a third free magnetic layer deposited in that order;

a lower nonmagnetic material layer, a lower pinned magnetic layer, and a lower antiferromagnetic underlying the free magnetic layer; and

an upper nonmagnetic material layer, an upper pinned magnetic layer, and an upper antiferromagnetic layer overlying the free magnetic layer;

wherein current flows in a direction perpendicular to a surface of each layer of the multilayer laminate, and

wherein β of magnetic materials constituting the first free magnetic layer and the third free magnetic layer have a sign same as β of a material constituting one of the lower pinned magnetic layer and the upper pinned magnetic layer, and different from β of magnetic materials constituting the second free magnetic layer and the other pinned magnetic layer, β being a characteristic value of a magnetic material satisfying the expression: $\rho\downarrow/\rho\uparrow = (1+\beta)/(1-\beta)$ $(-1 \leq \beta \leq 1)$,

where $\rho\downarrow$ is specific resistance for minority conduction electrons, and $\rho\uparrow$ is specific resistance for majority conduction electrons.

5. A magnetic detecting element comprising a multilayer laminate comprising:

a free magnetic layer including a first free magnetic layer, a nonmagnetic interlayer, a second free magnetic layer, a non magnetic interlayer, and a nonmagnetic interlayer deposited in that order;

a lower nonmagnetic material layer, a lower pinned magnetic layer, and a lower antiferromagnetic underlying the free magnetic layer; and

an upper nonmagnetic material layer, an upper pinned magnetic layer, and an upper antiferromagnetic layer overlying the free magnetic layer;

wherein current flows in a direction perpendicular to a surface of each layer of the multilayer laminate, and

wherein β of magnetic materials constituting the first free magnetic layer has a same sign as β of a material constituting the third free magnetic layer, and different from β of a material constituting the second free magnetic layer, and β of the material constituting one of the first free magnetic layer and the second free magnetic layer has the same sign as β of materials constituting the lower pinned magnetic layer and the upper pinned magnetic layer, β being a characteristic value of a magnetic material satisfying the expression: $\rho\downarrow/\rho\uparrow = (1+\beta)/(1-\beta)$ $(-1 \leq \beta \leq 1)$, where $\rho\downarrow$ is

specific resistance for minority conduction electrons, and $\rho\uparrow$ is specific resistance for majority conduction electrons.

6. A magnetic detecting element according to Claim 4 or 5, wherein the first free magnetic layer, the second free magnetic layer, the third free magnetic layer, the nonmagnetic interlayers, the lower nonmagnetic material layer, and the upper nonmagnetic material layer each have a thickness smaller than the specific spin diffusion length of the respective materials thereof.

7. A magnetic detecting element according to any one of Claims 1 to 6, wherein γ of each interface of the first free magnetic layer, the second free magnetic layer, the third free magnetic layer, the lower punned magnetic layer, and the upper pinned magnetic layer with the nonmagnetic material layers and the nonmagnetic interlayers has the same sign as β of the magnetic layer in contact with the interface, wherein γ is a characteristic value of an interface, satisfying the relationship $r\downarrow/r\uparrow = (1+\gamma)/(1-\gamma)$ $(-1 \leq \gamma \leq 1)$, where $r\downarrow$ is the interface resistance for minority conduction electrons and $r\uparrow$ is the interface resistance for majority conduction electrons.

8. A magnetic detecting element according to Claim 7, wherein at least one of the nonmagnetic material layers and the nonmagnetic interlayers has two layers comprising different materials, so that γ of the interface of the upper surface of said at least of the nonmagnetic material layers

and the nonmagnetic interlayers with the corresponding magnetic layer has a different sign from γ of the interface of the lower surface of said at least one of the nonmagnetic material layers and the nonmagnetic interlayers with the corresponding magnetic layer.

9. A magnetic detecting element comprising a multilayer laminate comprising:

a free magnetic layer including a first free magnetic layer, a second free magnetic layer, and a nonmagnetic interlayer between the first free magnetic layer and the second free magnetic layer;

a lower nonmagnetic material layer, a lower pinned magnetic layer, and a lower antiferromagnetic underlying the free magnetic layer; and

an upper nonmagnetic material layer, an upper pinned magnetic layer, and an upper antiferromagnetic layer overlying the free magnetic layer;

wherein current flows in a direction perpendicular to a surface of each layer of the multilayer laminate, and

wherein the first free magnetic layer, the second free magnetic layer, the lower pinned magnetic layer, and the upper pinned magnetic layer each comprise an alloy selected from group A consisting of NiX alloys, CoT alloys, FeZ alloys, and Co-Mn-D alloy and group B consisting of NiM alloys, CoQ alloys, and FeA alloys, one of the first free magnetic layer and the second free magnetic layer, the lower pinned magnetic layer, and the upper pinned magnetic layer comprise an alloy

belonging to one of group A and group B, and the other free magnetic layer comprises an alloy belonging to the other group, where X of the NiX alloys is an element selected from the group consisting of Co, Fe, Mn, Zr, Hf, Cu, and Au, T of the CoT alloys is an element selected from the group consisting of Fe, Zr, Ta, and Hf, Z of the FeZ alloys is an element selected from the group consisting of Ni, Co, Rh, Pt, Ir, Be, Al, Si, Ga, and Ge, D of the Co-Mn-D alloys is an element selected from the group consisting of Al, Ga, Si, Ge, and Sn, M of the NiM alloys is an element selected from the group consisting of Cr, Rh, Ru, Mo, Nb, Pt, Ir, Os, Re, W, and Ta, Q of the CoQ alloys is an element selected from the group consisting of Mn, Cr, Ru, Mo, Ir, Os, Re, and W, and A of the FeA alloys is an element selected from the group of Mn, Cr, V, Ti, Ru, Mo, Os, Re, and W.

10. A magnetic detecting element comprising a multilayer laminate comprising:

a free magnetic layer including a first free magnetic layer, a second free magnetic layer, and a nonmagnetic interlayer between the first free magnetic layer and the second free magnetic layer;

a lower nonmagnetic material layer, a lower pinned magnetic layer, and a lower antiferromagnetic underlying the free magnetic layer; and

an upper nonmagnetic material layer, an upper pinned magnetic layer, and an upper antiferromagnetic layer overlying the free magnetic layer;

wherein current flows in a direction perpendicular to a surface of each layer of the multilayer laminate, and

wherein the first free magnetic layer, the second free magnetic layer, the lower pinned magnetic layer, and the upper pinned magnetic layer each comprise an alloy selected from group A consisting of NiX alloys, CoT alloys, FeZ alloys, and Co-Mn-D alloy and group B consisting of NiM alloys, CoQ alloys, and FeA alloys, the first free magnetic layer and one of the lower pinned magnetic layer and the upper pinned magnetic layer comprise an alloy belonging to one of group A and group B, and the second free magnetic layer and the other pinned magnetic layer comprise an alloy belonging to the other group, where X of the NiX alloys is an element selected from the group consisting of Co, Fe, Mn, Zr, Hf, Cu, and Au, T of the CoT alloys is an element selected from the group consisting of Fe, Zr, Ta, and Hf, Z of the FeZ alloys is an element selected from the group consisting of Ni, Co, Rh, Pt, Ir, Be, Al, Si, Ga, and Ge, D of the Co-Mn-D alloys is an element selected from the group consisting of Al, Ga, Si, Ge, and Sn, M of the NiM alloys is an element selected from the group consisting of Cr, Rh, Ru, Mo, Nb, Pt, Ir, Os, Re, W, and Ta, Q of the CoQ alloys is an element selected from the group consisting of Mn, Cr, Ru, Mo, Ir, Os, Re, and W, and A of the FeA alloys is an element selected from the group of Mn, Cr, V, Ti, Ru, Mo, Os, Re, and W.

11. A magnetic detecting element according to Claim 10, wherein the first free magnetic layer, the nonmagnetic

interlayer, the second free magnetic layer, the lower nonmagnetic material layer, and the upper nonmagnetic material layer each have a thickness smaller than the specific spin diffusion length of the respective materials thereof.

12. A magnetic detecting element comprising a multilayer laminate comprising:

a free magnetic layer including a first free magnetic layer, a nonmagnetic interlayer, a second free magnetic layer, a nonmagnetic interlayer, and a third free magnetic layer deposited in that order;

a lower nonmagnetic material layer, a lower pinned magnetic layer, and a lower antiferromagnetic underlying the free magnetic layer; and

an upper nonmagnetic material layer, an upper pinned magnetic layer, and an upper antiferromagnetic layer overlying the free magnetic layer;

wherein current flows in a direction perpendicular to a surface of each layer of the multilayer laminate, and

wherein the first free magnetic layer, the second free magnetic layer, the third free magnetic layer, the lower pinned magnetic layer, and the upper pinned magnetic layer each comprise an alloy selected from group A consisting of NiX alloys, CoT alloys, FeZ alloys, and Co-Mn-D alloy and group B consisting of NiM alloys, CoQ alloys, and FeA alloys, the first free magnetic layer, the third free magnetic layer, and one of the lower pinned magnetic layer and the upper

pinned magnetic layer comprise an alloy belonging to one of group A and group B, and the second free magnetic layer and the other pinned magnetic layer comprise an alloy belonging to the other group, where X of the NiX alloys is an element selected from the group consisting of Co, Fe, Mn, Zr, Hf, Cu, and Au, T of the CoT alloys is an element selected from the group consisting of Fe, Zr, Ta, and Hf, Z of the FeZ alloys is an element selected from the group consisting of Ni, Co, Rh, Pt, Ir, Be, Al, Si, Ga, and Ge, D of the Co-Mn-D alloys is an element selected from the group consisting of Al, Ga, Si, Ge, and Sn, M of the NiM alloys is an element selected from the group consisting of Cr, Rh, Ru, Mo, Nb, Pt, Ir, Os, Re, W, and Ta, Q of the CoQ alloys is an element selected from the group consisting of Mn, Cr, Ru, Mo, Ir, Os, Re, and W, and A of the FeA alloys is an element selected from the group of Mn, Cr, V, Ti, Ru, Mo, Os, Re, and W.

13. A magnetic detecting element comprising a multilayer laminate comprising:

a free magnetic layer including a first free magnetic layer, a nonmagnetic interlayer, a second free magnetic layer, a nonmagnetic interlayer, and a third free magnetic layer deposited in that order;

a lower nonmagnetic material layer, a lower pinned magnetic layer, and a lower antiferromagnetic underlying the free magnetic layer; and

an upper nonmagnetic material layer, an upper pinned magnetic layer, and an upper antiferromagnetic layer

overlying the free magnetic layer;

wherein current flows in a direction perpendicular to a surface of each layer of the multilayer laminate, and

wherein the first free magnetic layer, the second free magnetic layer, the third free magnetic layer, the lower pinned magnetic layer, and the upper pinned magnetic layer each comprise an alloy selected from group A consisting of NiX alloys, CoT alloys, FeZ alloys, and Co-Mn-D alloy and group B consisting of NiM alloys, CoQ alloys, and FeA alloys, the first free magnetic layer and the third free magnetic layer comprise an alloy belonging to one of group A and group B, the second free magnetic layer comprises an alloy belonging to the other group, and the lower pinned magnetic layer and the upper pinned magnetic layer comprise an alloy belonging to the same group as in one of the first free magnetic layer and the second free magnetic layer, where X of the NiX alloys is an element selected from the group consisting of Co, Fe, Mn, Zr, Hf, Cu, and Au, T of the CoT alloys is an element selected from the group consisting of Fe, Zr, Ta, and Hf, Z of the FeZ alloys is an element selected from the group consisting of Ni, Co, Rh, Pt, Ir, Be, Al, Si, Ga, and Ge, D of the Co-Mn-D alloys is an element selected from the group consisting of Al, Ga, Si, Ge, and Sn, M of the NiM alloys is an element selected from the group consisting of Cr, Rh, Ru, Mo, Nb, Pt, Ir, Os, Re, W, and Ta, Q of the CoQ alloys is an element selected from the group consisting of Mn, Cr, Ru, Mo, Ir, Os, Re, and W, and A of the FeA alloys is an element selected from the group of Mn, Cr, V, Ti, Ru,

Mo, Os, Re, and W.

14. A magnetic detecting element according to Claim 13, wherein the first free magnetic layer, the nonmagnetic interlayer, the second free magnetic layer, the nonmagnetic interlayer, the third free magnetic layer, the lower nonmagnetic material layer, and the upper nonmagnetic material layer each have a thickness smaller than the specific spin diffusion length of the respective materials thereof.

15. A magnetic detecting element according to Claim 13, wherein at least one of the lower nonmagnetic material layer, the upper nonmagnetic material layer, and the nonmagnetic interlayers is a laminate including a Cu layer and a Cr layer, and the laminate lies between one of the magnetic layers comprising an alloy belonging to group A and one of the magnetic layers comprising an alloy belonging to group B.

16. A magnetic detecting element according to Claim 13, wherein the lower pinned magnetic layer and the upper pinned magnetic layer each comprise two magnetic layers and a nonmagnetic interlayer between the two magnetic layers.